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DEPARTMENT OF THE ARMY FIELD MANUAL

PATHFINDER GUIDANCE FOR ARMY AIRCRAFT



HEADQUARTERS, DEPARTMENT OF THE ARMY

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PATHFINDER GUIDANCE FOR ARMY AIRCRAFT

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•• This manual supersedes appendix II of FM 57-35, 2 November 1960.

CHAPTER 1

INTRODUCTION

1. Purpose and Scope

This manual is a guide for commanders and staffs of ground and aviation units in organizing, training, and employing pathfinder detachments and unit pathfinders to furnish pathfinder guidance to Army aircraft. It applies to the operations of all combat and service units in the field and is applicable to nuclear and nonnuclear warfare.

2. Comments or Recommended Changes

Users of this manual are encouraged to submit recommended changes or comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of the text in which change is recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commandant, U. S. Infantry School, Fort Benning, Ga.

3. Use of Glossary

This manual will be easier to understand if the reader will familiarize himself at this point with the terms and definitions in the glossary.

CHAPTER 2

PATHFINDER DETACHMENT

4. General

a. Concept. Pathfinders are dropped or air landed at or in the vicinity of an objective to establish and operate navigational aids for the purpose of guiding aircraft to the drop or landing zones, and as such represent the lowest echelon of the field army air traffic control system. During the conduct of operations in forward areas involving a heavy density of Army aircraft, the controlling flight operations center normally employs a subordinate, cellular air traffic control element (flight coordination center (FCC)) with the force controlling these operations. The FCC assists the force commander in controlling Army air traffic in forward areas of the division. The FCC establishes the necessary ground-to-ground and ground-to-air communications to enable the force commander to coordinate the operations of pathfinder elements in the loading areas and in the objective area and of flight and serials operating between these areas. Pathfinders in the loading areas control air traffic within the loading areas and between the loading areas and the IP; pathfinders in the objective area control air traffic within the drop and landing zones and between the release point (RP) and the drop or landing zones. Air traffic between the IP and RP is controlled by the FCC.

b. Mission. The pathfinder detachment provides pathfinder guidance for air landing or air delivery operations on or over enemy dominated or enemy threatened areas or areas not previously reconnoitered. The commander of a unit that undertakes an airmobile or airborne operation must *determine whether or not the operation warrants a request for pathfinder detachment support, or if his unit personnel are capable of providing the necessary guidance.*

c. Assignment and Attachment. Pathfinder detachments are assigned on the basis of one detachment for each transportation transport aircraft battalion. The detachments may be attached to aviation or ground units to enhance the unit's capability for executing air landed or air delivery operations.

d. Organization. A detachment has 2 officers and 13 enlisted

men, all of whom must be qualified parachutists and capable of performing the duties of every other man in the detachment.

5. Capabilities and Limitations

a. Capabilities. The detachment—

- (1) Furnishes pathfinder guidance for Army aircraft on critical missions, which includes the capability of—
 - (a) Selecting, marking, and operating air landing or air delivery facilities.
 - (b) Providing ground-to-air voice radio communication.
 - (c) Providing pilots with information concerning the enemy, wind direction and velocity, traffic patterns, approach and departure routes and altitudes, field elevation, and other information as requested; and giving landing and takeoff instructions.
- (2) Removes obstacles or hazards to landing operations.
- (3) Conducts periodic ground and aerial radiological monitoring (TC 101-1) en route to and within the landing area.
- (4) Makes limited reconnaissance of and marks the initial assembly area for supported troop units.
- (5) Provides limited security for its own operations.

b. Limitations. The pathfinder detachment has little capability for performing functions other than aircraft guidance.

- (1) When the method of delivering pathfinders to the objective area permits, the supported unit should augment the detachment with attachments to—
 - (a) Reconnoiter and mark troop assembly areas, if used.
 - (b) Do minor pioneer work.
 - (c) Conduct periodic radiological monitoring.
 - (d) Provide security for the pathfinder team and advance element personnel operating within the landing area.
- (2) The availability of aerial vehicles needed to deliver the pathfinder detachment, and the capacity of those available, may limit the number of personnel and the amount and type of equipment that can be employed.

6. Employment

a. Concept. The pathfinder detachment is employed under the command and control of the unit to which it is attached. When both ground and aviation units are involved in an operation, it is attached to the ground unit.

b. Coordination. The ground unit and the pathfinder detachment must coordinate their operations to the fullest extent. To do this properly, the detachment should know as much as is appropriate of the—

- (1) Operational plan.
- (2) Departure area and time.
- (3) Loading plan.
- (4) Air movement plan.
- (5) Landing plan.
- (6) Unloading plan.
- (7) Assembly plan and techniques, if applicable.

c. Reinforcement by Supported Unit. The pathfinder detachment may require assistance from the supported ground unit. See paragraph 5b(1) for details.

d. Means and Methods of Delivery.

- (1) *Air delivery.* Air delivery permits delivery on terrain which is not suitable for either helicopter or airplane landings.
 - (a) Based on wind direction and velocity, pathfinders compute their desired jump and equipment drop points before reaching the objective area. The pilot must fly his aircraft at the speed and altitude and on the course requested by the senior pathfinder (jumpmaster). Jump altitudes vary with different type aircraft. Pathfinders drop their equipment and jump from the lowest practicable altitude to increase the accuracy of their landings and to preserve secrecy, unless special restrictions require otherwise.
 - (b) When feasible, air delivered pathfinders are equipped with parachutist's adjustable equipment bag to carry their equipment. This protects fragile items and insures that the equipment is readily available upon landing. Equipment to be delivered in nonindividual air delivery containers is packed so that like items are divided among the containers rather than being consolidated. It must be packed in such a way that it will not be damaged on landing. Containers, parachutes, and aircraft must be carefully rigged and prepared for operations to reduce the risk of malfunctions and inaccurate deliveries.
 - (c) Pathfinders and equipment must be loaded in the aircraft so that they can be dropped in the order desired. When more than one aircraft is used, and the

pathfinders are to be delivered to more than one area, they may be cross-loaded. The aircraft may fly singly or in formation, dropping pathfinders and equipment from each aircraft at designated points (fig. 1).

(2) *Landing by helicopter.*

- (a) A helicopter landing is more accurate than air delivery and it can be made in a stronger wind. Pathfinders and equipment can be delivered in a better state of operational readiness and the problem of assembly is reduced or eliminated. Therefore, the pathfinders need not precede the assault echelon by as great a time margin as when air delivered. This reduces the possibility of compromising the security of the operation.
- (b) If the helicopters can remain with the pathfinders, they can periodically monitor radiological contamination of the air and evacuate the area, if required.
- (c) Figure 2 illustrates a method of landing pathfinders on multiple sites by helicopter.

(3) *Landing by airplane.*

- (a) An airplane landing has the same advantages over air delivery as those described for a helicopter landing ((2) (a) above).
- (b) An airplane landing has advantages in range and speed over a helicopter landing, but the need for comparatively large, obstacle-free landing areas limits the use of airplanes for pathfinder delivery.
- (4) *Other means of delivery.* Pathfinders may move to their objective area in tanks or other ground vehicles, by surface or subsurface water transportation, by infiltrating on foot, or by a combination of these means.

e. Timing. Pathfinders may precede or accompany the assault echelon to the objective area. Their time of arrival is based on tactical considerations. The advantages in having landing facilities prepared and landing aids, communications, and other equipment set up before the assault echelon arrives must be weighed against the risk that early activity in the area may compromise the security of the main operation.

- (1) Pathfinders may precede the assault echelon by minutes, hours, or days. Whatever the length of this time, they must use it to the fullest extent in preparation of the LZ/DZ. To lessen the risk of discovery, their arrival

may be timed to take place at dusk or night, or it may be concealed by feints or other means within the commander's capability. It is best for the pathfinders to precede the assault echelon when the main operation is to take place at night or over precipitous, broken, or other type terrain that presents navigational and landing hazards.

- (2) Simultaneous arrival with the assault echelon is best employed when the operation is to be conducted in daylight on open landing or drop zones which pilots can locate without pathfinder assistance. When pathfinders accompany the assault echelon, they assist all subsequent flights.

7. Training

a. Responsibilities.

- (1) Major unit commanders are responsible for pathfinder detachment training and proficiency, and for integrating the training with that of aviation and ground units.
- (2) The United States Army Infantry School (USAIS) will continue to provide a course of instruction which will train an individual as a pathfinder.

b. Standards. Pathfinders will be trained to satisfactorily accomplish the missions and duties prescribed in this training circular.

c. Acquisition and Retention of Qualification. Pathfinder qualification is attained only through graduation from the pathfinder course, USAIS. Members of pathfinder detachments retain proficiency through unit detachment training and practice in conjunction with Army aviation pilot proficiency training and air-mobile/airborne operations.

8. Pathfinder Equipment

a. General. The TOE of the pathfinder team provides duplicate sets of equipment. Equipment essential to the operation should be carried into the objective area in duplicate to insure operational effectiveness.

b. Navigation Aids. Navigation aids are used to help pilots find an exact area. The two principal types employed by pathfinders are electronic and visual.

- (1) *Electronic navigation aids* employ a radio signal. They include both homing beacons and radios. They have a greater range and offer more security than visual be-

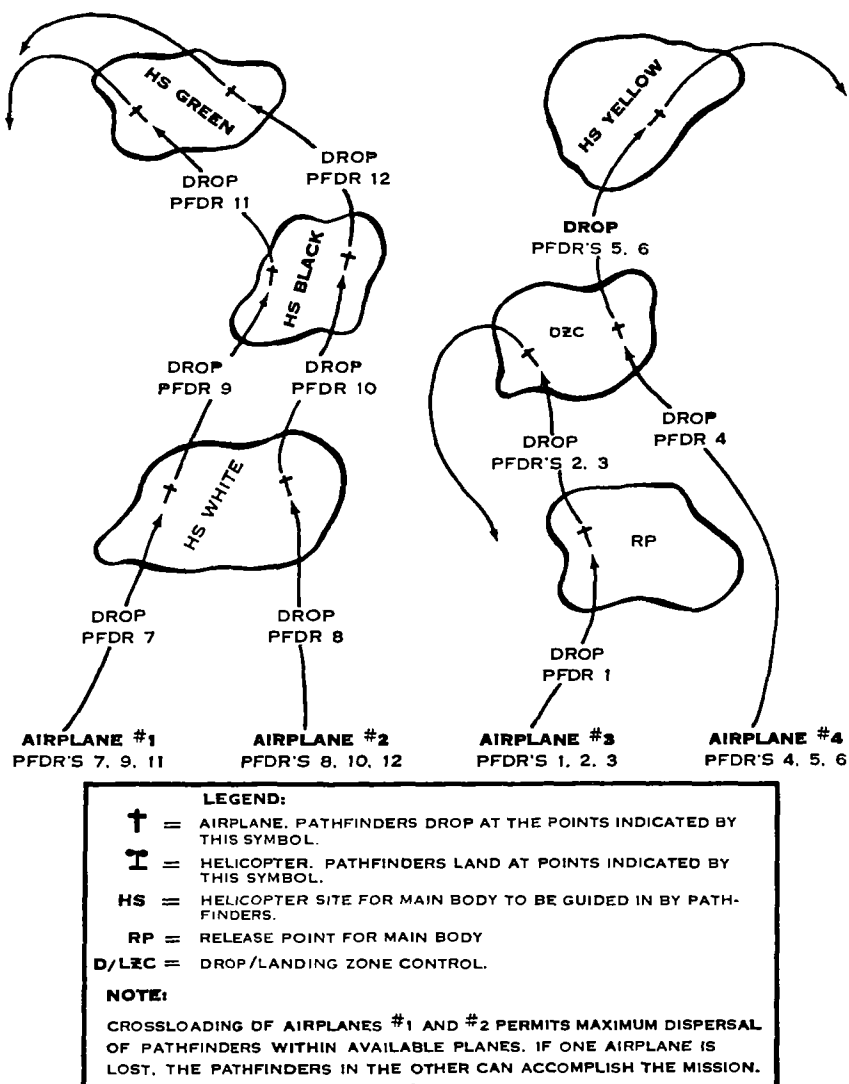


Figure 1. Air delivery to multiple sites by airplane.

cause visual signals (flares, smoke pots, etc.) may be easily spotted by the enemy. While radio is ordinarily considered an insecure means of signaling, in this instance the time required to obtain a DF fix and dispatch a force to the area makes it relatively secure. Further, the radio beacon can be triggered on and off from aircraft, it operates unattended, and may be easily concealed.

(2) *Visual navigation aids* are employed to designate specific

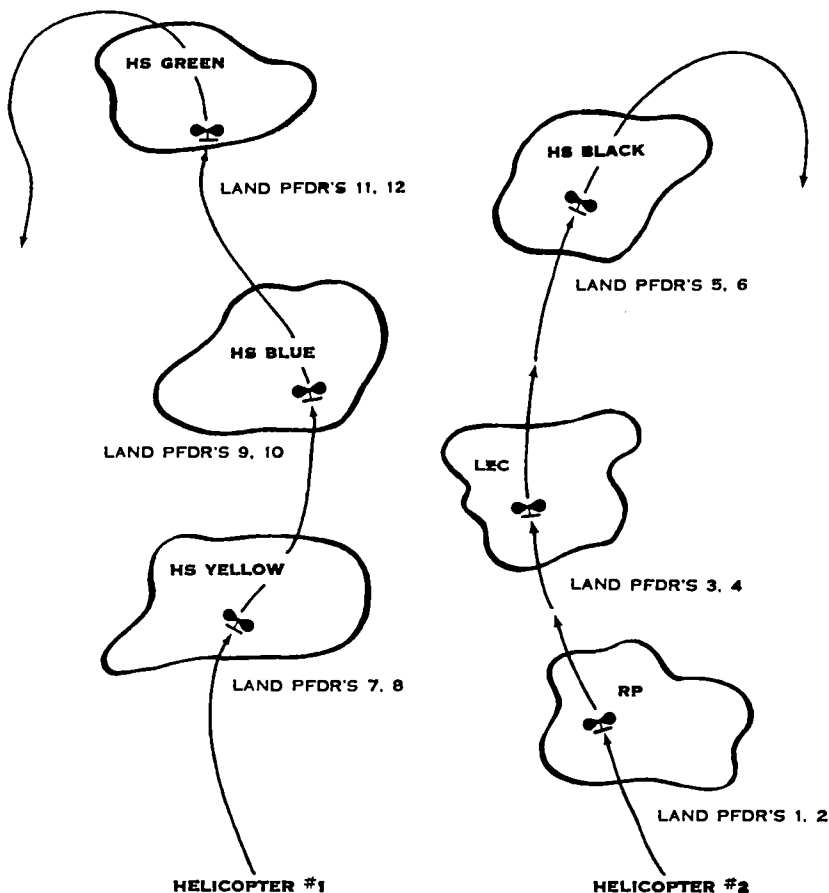


Figure 2. Air landing on multiple sites by helicopter.

areas or points in landing and drop zones, and for ground-to-air signals. Day visual navigation aids include panels, smoke, and flags. Night visual navigation include light beacons, lanterns, flashlights, and pyrotechnics.

c. *Communication Equipment.* Communication equipment is used to provide ground-to-air voice radio communications, operate a pathfinder command net, and maintain communication with the commander of the unit to which the pathfinders are attached.

d. *Assembly Aids.* Assembly aids are electronic or visual devices used to designate troop or supply assembly areas.

- (1) *Electronic assembly aids* (for reason given in b(1) above) employ a radio signal. They include radios and homing devices. They provide more security and range

than visual assembly aids, but it takes more time to assemble them and special equipment and training is required to operate them.

- (2) *Visual assembly aids* offer simplicity of employment and positive identification of assembly areas, but they can be seen by the enemy as well as friendly troops. These aids include panels, smoke, flags, and arm bands for day operations; and lanterns, flashlights, light beacons, and pyrotechnics for night operations.

e. Miscellaneous. Additional items of equipment and weapons are as authorized in TOE 7-168.

CHAPTER 3

UNIT PATHFINDERS

9. General

a. Mission. Unit pathfinders provide guidance within the limits of their capabilities to Army aircraft engaged in air landing or air delivery operations.

b. Assignment and Attachment. Since guidance is performed by personnel organic to the using unit, there is no requirement for special assignment or attachment of personnel for this purpose.

c. Organization. There is no formal organization for unit pathfinders. One or several may be designated to provide aircraft guidance for a particular operation. One trained unit pathfinder may, assisted by an untrained detail, establish and operate the required air landing or delivery facility.

10. Capabilities and Limitations

a. Capabilities. Unit pathfinders, within equipment and training limitations, will—

- (1) Furnish aircraft guidance to Army aircraft to include—
 - (a) Reconnoitering for, selecting, and operating air delivery or air landing facilities.
 - (b) Providing ground-to-air voice radio communication.
 - (c) Providing pilots with limited information concerning the enemy, wind condition, field elevation, and other information as requested; and giving landing and takeoff instructions.
- (2) Remove small obstacles or hazards to landing operations.

b. Limitations.

- (1) Unit pathfinders will perform aircraft guidance as a normal function in addition to their other combat, training, or administrative duties.
- (2) Since unit pathfinders are not organized as teams, they must be given thorough individual and unit training so they can operate efficiently with any other pathfinders on an aircraft guidance mission.

11. Employment

a. Unit commanders at all levels employ their unit pathfinders to furnish aircraft guidance for landing or air delivery operations in areas under their control. It is the responsibility of the unit commander involved to determine whether the extent and complexity of the aircraft guidance required for a particular operation place it within the capabilities of his unit pathfinders or indicate the need for employing a pathfinder detachment.

b. During field operations, aircraft may have to land in a unit's area at any time. Therefore, it must be SOP to make continual reconnaissance for and select air landing and air delivery zones in the area, and to maintain a continuous capability for providing aircraft guidance.

12. Training

a. Responsibility.

- (1) The training of pathfinder personnel is a responsibility of the unit commander employing Army aviation in the field army. The capability for providing aircraft guidance should parallel mission responsibilities of the unit or the installation. Personnel selected for pathfinder training will be given instruction in aircraft guidance techniques as shown in appendix IV, pending publication of an approved ATP.
- (2) Major unit commanders are responsible for coordinating the combined training of aviation and ground units.

b. Conduct.

- (1) Initial training should be formal. After personnel have demonstrated their ability to satisfactorily perform the basic techniques, training should progress to practical application in the field.
- (2) Trained unit pathfinders or individuals from pathfinder detachments may be used as instructors for unit pathfinder training.
- (3) Training will be integrated with normally associated aviation unit(s) to insure detailed knowledge of operational and/or limitations of current inventory aircraft and to establish close personnel familiarity with aviation operating procedures.

13. Equipment

a. Equipment for unit pathfinders will be that authorized by the unit by tables of organization and equipment (TOE) and tables of allowances (TA).

b. Navigation aids, assembly aids, and communication equipment are the same type or similar to those used by pathfinder detachments within the limits of the TOE of the unit involved.

c. Unit pathfinders may have to use expedients for ground-to-air signals, but they will employ normal techniques in using them. Unit signal operation instructions (SOI) should reflect standard procedures.

d. When warranted, major unit commanders may be authorized special items of pathfinder equipment under the provisions of AR 725-5.

CHAPTER 4

PLANNING

Section I. PRELIMINARY PLANNING

14. Introduction

This chapter is applicable to pathfinder detachments and unit pathfinders except that unit pathfinders generally do not establish or operate Drop/Landing Zone Controls (D/LZC) and release points (RP). Other minor differences in application are pointed out as they appear.

15. Coordination

The commanders of the ground and aviation units coordinate and preplan the details of the operation that requires pathfinder assistance. The pathfinder detachment commander may make recommendations as to the location of the drop or landing zone, the formation to be flown, and the time schedule to be followed. The aviation unit commander coordinates with the ground unit commander in deciding on primary and alternate flight routes, the communication check point, type loads, time schedule, and flight formation.

16. Briefing

Each pathfinder must be thoroughly briefed on the location and operation of the proposed landing or air delivery facilities; the flight route, formation, and time schedule; the air control point; and the specific duties he is to perform. He should be given an opportunity to study air photos of the objective area.

17. Selection of Landing and Drop Zones

The ground unit commander selects landing and drop zone locations based on the tactical, operational, and technical requirements, considering time, space, and related physical factors. Every effort to select a satisfactory site must be made since no amount of perfection or timely precision in the delivery of aircraft into a specified area can compensate for a bad site. If the pathfinder detachment commander determines, after reaching the landing area, that the selected landing zones (LZ's) or drop zones

(DZ's) are not suitable for the operation, he must so advise the commander and recommend other locations.

18. Dispersion

When multiple drop or landing zones are operated, facilities must be dispersed enough to avoid unsafe aircraft flight patterns and interference on the ground-to-air radio nets. When adequate dispersion is not possible, the times of delivery to each facility must be closely coordinated.

19. Selection of Troop Assembly Areas

If troop assembly areas are needed, the ground unit commander selects them, tentatively, from map and air photo studies. When the pathfinders arrive in the landing area, they reconnoiter the ground to check on the feasibility of using the assembly areas, and to mark them. If the areas originally selected are not usable, the pathfinders select others nearby.

20. Organization of Landing Area (fig. 3).

a. One or more LZ's and/or DZ's may be planned for a single landing area. The pathfinder detachment establishes one or more Drop/Landing Zone Controls (D/LZC) to control air traffic into, within, and outside each LZ and DZ.

b. A release point (RP) may be used to help in guiding aircraft to their individual zones and sites. It is marked with panels. An RP is required for most helicopter operations, but is not generally used for an airplane landing or air delivery.

21. Pathfinder Night Operations

If pathfinders are to be delivered during twilight, the planning and accomplishment of the initial air and ground reconnaissance is the same as for a daylight operation. If they are to be delivered after the end of evening nautical twilight, more time must be allowed for the ground reconnaissance. The continuing reconnaissance and improvement of the landing or drop zone will progress much more slowly at night than by day.

22. Detachment Organization for An Operation

a. The organization for any particular operation depends on the—

- (1) Number and condition of landing facilities.
- (2) Number of pathfinders to be employed.

- (3) Number of aircraft assigned to each flight.
- (4) Number of aircraft transporting the pathfinder unit and attachments.
- (5) Time that pathfinders will enter the landing area.

b. In support of the tactical plan and in keeping with the assigned mission, the following personnel, with their radio operators, may accompany the pathfinder detachment:

- (1) Artillery forward observer.
- (2) Forward air controller.
- (3) Liaison officer from the supported unit.
- (4) Attachments from the supported unit as requested by the pathfinder detachment commander.

c. Where special obstacles are suspected in a drop or landing zone, the pathfinder detachment should be augmented by special teams to deal with these obstacles.

23. Equipment

The equipment needed for an operation depends on the size and coordination of the landing area; the number of aircraft assigned to each flight; the method of delivering the pathfinders to the landing area; the amount and type of assistance to be furnished to aircraft and troops; and whether or not nuclear weapons have been employed.

24. Reconnaissance

a. Reconnaissance of drop and landing zones is an important pathfinder task. When the pathfinder detachment uses attachments to assist in this task, it should be carefully planned and the attachments should be briefed and rehearsed.

b. A detailed study of air photos of the proposed landing sites facilitates planning for removing or marking obstacles.

c. Reconnaissance considerations are given in detail in TM 5-251.

Section II. FINAL PREPARATIONS

25. General

Pathfinders are responsible for reaching the landing area by foot, ground vehicle, surface or underwater vessel, or air vehicle (either air landed or air delivered).

26. Operation Order

- a. The pathfinder detachment commander issues an operation order (app. II) to the detachment and its attachments. The order usually oral, is detailed enough to insure that each man understands his individual duties and the overall pathfinder guidance mission. An operation planning form is shown in appendix III.
- b. The pathfinder detachment and attachments are organized into parties according to the tasks they will perform and the means of moving to the landing area. When possible, each person carries the items of equipment he will employ.

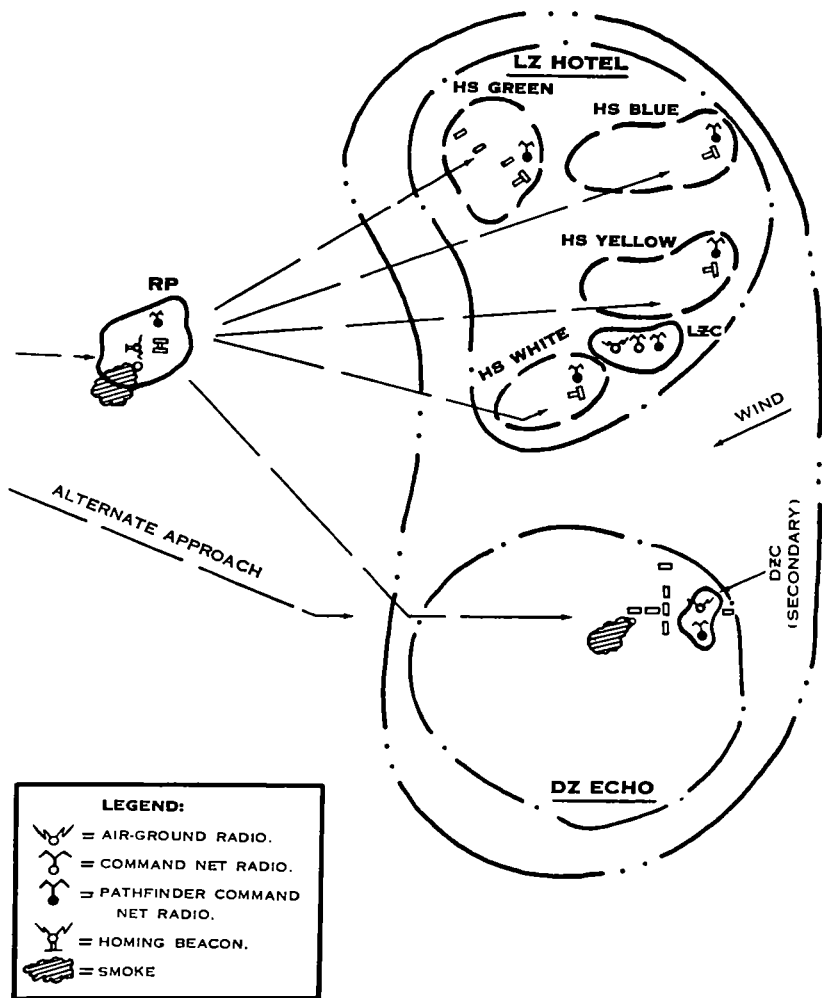


Figure 8. Landing area with 1 drop zone and 1 helicopter landing zone with 4 helicopter landing sites (schematic).

27. Air Movement of Pathfinders

a. Pathfinder Responsibility. When pathfinders move to the landing area by air, the ranking pathfinder in each aircraft is responsible for maintaining communication with the pilot and observing the flight route.

b. Reconnaissance From the Air. On arrival over the landing area, the aircraft may be employed to make a hasty reconnaissance of the locations previously selected for the facilities. The air reconnaissance if used should be completed quickly to avoid compromising the security of the operation and losing valuable time.

CHAPTER 5

ESTABLISHMENT AND OPERATION OF LANDING AREA

Section I. GENERAL

28. Introduction

This chapter is applicable to pathfinder detachments; it is applicable to unit pathfinders with the exceptions noted in paragraph 14.

29. Hasty Ground Reconnaissance

On arriving in the landing area, each pathfinder party hastily reconnoiters the exact location selected for the establishment of its facility. This is in addition to any reconnaissance from the air (par. 27). If the preselected locations are not desirable, the pathfinders select better ones as nearby as possible. If they land in the area by helicopter, they can use it for the move to the newly selected locations. Otherwise, they move by the next fastest means available. If they precede the assault echelon by any means other than helicopter, they usually will have to make the move on foot.

30. Reporting Critical Information

As soon as possible, the pathfinder parties report the results of their reconnaissance to the D/LZC via the pathfinder command net; i.e., information obtained of the enemy and the preferred direction of landing or approach. The detachment commander takes immediate steps to determine and transmit the following information:

- a. To the supported unit commander:
 - (1) EEI as required by operation order.
 - (2) Results of radiological monitoring.
 - (3) Conditions that might require changes in LZ's, DZ's, or assembly areas.
- b. To the aircraft unit commander, serial or flight leader, or individual pilot, as applicable:
 - (1) The magnetic heading from the air control point to the RP and to the specific helicopter site, landing strip, or drop zone.
 - (2) Obstacles located at or near landing or air delivery facilities.

- (3) The traffic pattern for approach to and departure from the landing or drop zone(s).
- (4) Wind direction and velocity.
- (5) Altitude of approach.
- (6) Elevation of the air delivery or landing facility.
- (7) Altitude for air delivery (if applicable).
- (8) Other information considered necessary.

31. Obstacle Removal

One of the pathfinders' first jobs in the landing and drop zones is to remove or mark obstacles and hazards to the operation. Where major obstacles are encountered which may critically affect the operation, immediate action must be taken to notify the responsible ground commander. The task of removing obstacles continues as long as necessary.

Section II. DROP/LANDING ZONE CONTROL AND RELEASE POINT

32. Drop/Landing Zone Control

a. General. The purpose of the D/LZC (fig. 4) is to control air traffic on the approach to and within a landing area, and to promote its safe, orderly, and expeditious movement. The D/LZC is the pathfinder command post and communications center. Its location is tentatively selected by map reconnaissance and air photo study. The tentative location is changed if the ground reconnaissance indicates that it is not suitable (par. 29). The D/LZC is normally set up on terrain that dominates the facility(ies) to be operated to insure maximum visual and radio communication ranges. In some instances, it may be advantageous to set it up at one of the facilities to make the best use of available manpower; for example, by having D/LZC personnel assist the T (par. 43a) party at a DZ or to increase security for night operations. If the facility location is used, the radios must be set up far enough from the landing, taxiing, and parking installations to prevent aircraft engine noise from interfering with radio transmissions. In addition, terrain masks must be carefully avoided because the D/LZC must establish and maintain radio contact with all the facilities it is to operate.

b. Organization and Duties of the D/LZC Party.

- (1) The D/LZC should be organized to suit the requirements of the mission. A typical organization consists of—
 - (a) The pathfinder detachment commander, who acts as the LZ or DZ control officer and controls aircraft

landings and departures, or air deliveries. For maximum support operations, he may also be the ground-to-air radio operator ((b) below).

- (b) The ground-to-air radio operator, who operates the radio used to maintain communication with aircraft in flight, and who aids in the control of aircraft by observation.
 - (c) The pathfinder command net operator, who operates the radio used to maintain communication with other elements of the pathfinder team. He aids in the control of aircraft by observation and maintains a record (app. III) of aircraft arrivals and departures and the general types of loads. If more than five landing facilities are established in the landing zone and there is only one D/LZC, two ground communication nets should be established with an operator for each.
 - (d) The radio operator, who operates the radio used to communicate with the supported unit and with other D/LZC's in the landing area.
 - (e) Security personnel, who defend the D/LZC against enemy attack, assist in carrying and installing equipment, and relieve other personnel as necessary.
- (2) A D/LZC must be established for each DZ and LZ. The detachment commander is located at the primary D/LZC. All other D/LZC's are called secondary. If there is only one secondary D/LZC, the detachment executive officer is responsible for its functions; if there are more, the detachment commander designates the individual responsible for each additional one.

33. Release Point

a. General. An RP (fig. 5) is established to provide a traffic control point and final navigation check point for aircraft approaching the landing or air delivery facilities within a landing area. The RP is used primarily to control helicopter traffic into an LZ that contains multiple helicopter sites, but it may also be used as an aid to navigation and traffic control when more than one drop and/or landing facility is established in the landing area; e.g., two drop zones, or one airplane landing zone and four helicopter sites. The location for the RP is tentatively selected by map and air photo study. It is a point on the planned flight route to the landing zone. It should be on a prominent terrain feature or a structure on high, open terrain that offers maximum operating range for long-range electronic and visual navigation aids.

b. Organization and Duties of the RP Party.

- (1) There must be at least one pathfinder in the RP party. He positions and operates the electronic and visual navigation aids. He operates the pathfinder command net radio.
- (2) The RP party may include the following pathfinder or attached personnel to perform the duties described:
 - (a) An operator for the pathfinder command net radio. He maintains communications with the D/LZC.
 - (b) An indeterminate number of security personnel. They defend the RP against attack and assist in carrying, assembling, and operating equipment as required.

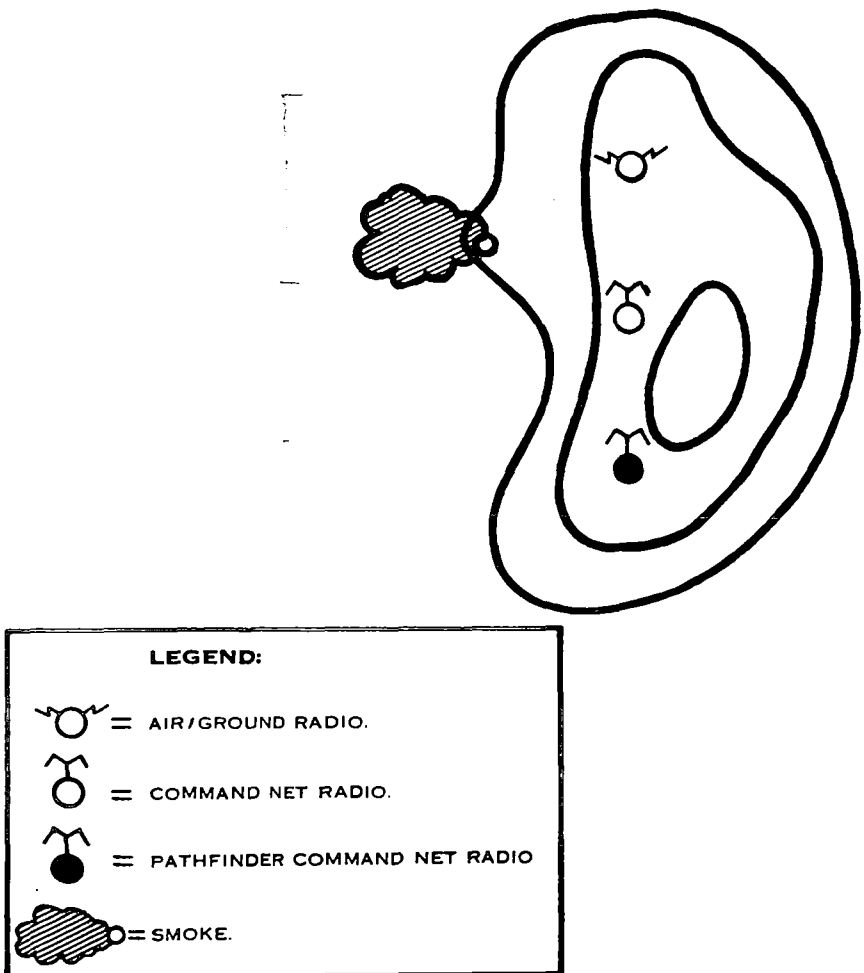


Figure 4. Drop/landing zone control (schematic).

c. Operation of the Release Point.

- (1) The pathfinder in charge of the RP (b(1) above), assisted by security personnel, if available and needed, immediately installs the long-range navigation aids.
- (a) He first prepares the electronic homing beacons for operation because they offer longer range and greater security than visual aids. He sets out the beacons far enough apart to prevent excessive interference with each other and with the ground radio, and to

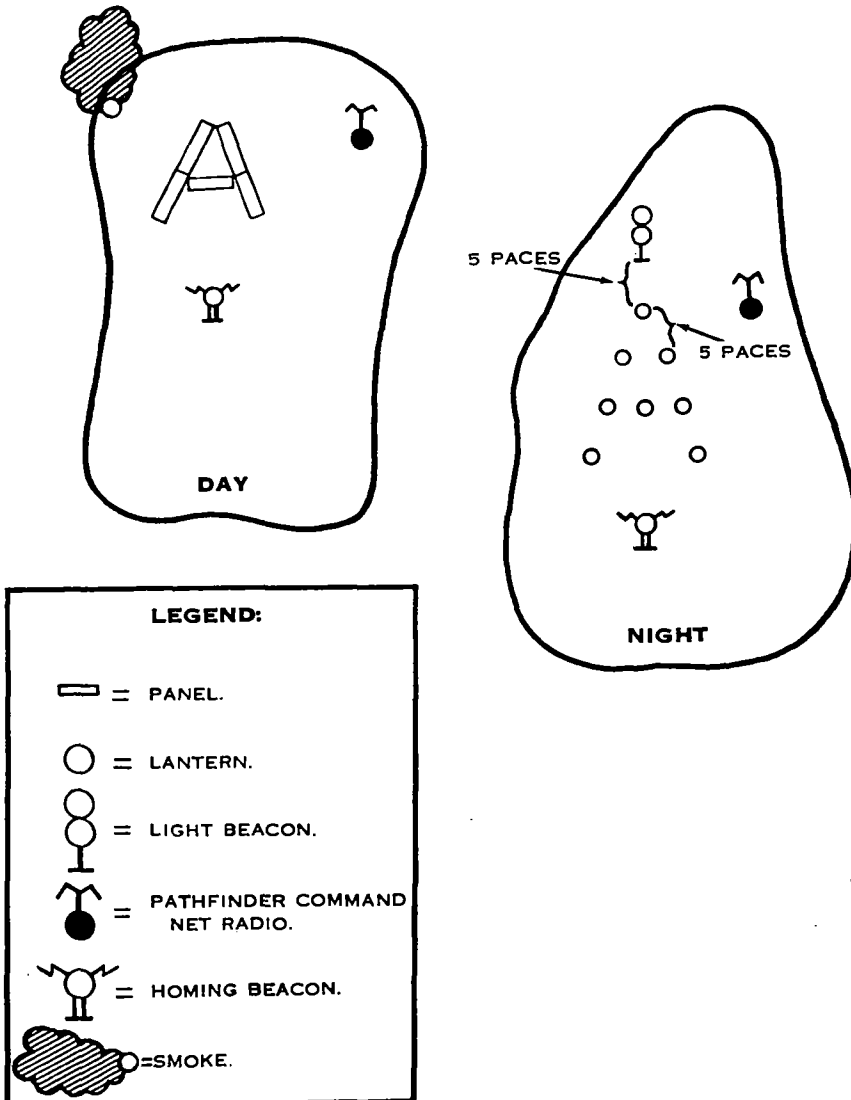


Figure 5. Release point (schematic).

reduce the possibility that enemy fire will destroy all beacons at once. He places the beacons into operation at the time prescribed by plan.

- (b) Next, the pathfinder-in-charge prepares his visual navigation aids for operation. They are used to indicate a location that pilots can positively identify (fig. 3). It may be necessary to remove grass or brush to prevent their being masked.
- (2) The pathfinder command net radio operator establishes communication with the D/LZC as quickly as possible to report the RP's state of readiness and the enemy situation. He keeps his radio on constant standby unless he has been directed to operate it on a definite time schedule.
- (3) Security personnel move to their assigned locations and take up firing positions or assist in establishing and operating navigation aids and communication equipment.

Section III. HELICOPTER LANDING ZONE

34. General

a. A helicopter landing zone contains one or more helicopter sites. It may have its own D/LZC and RP or it may use a D/LZC and RP in common with an adjacent DZ or LZ.

b. The pathfinder detachment is organized into three basic type parties for operating the zone: the D/LZC party, the RP party, and helicopter site (HS) parties. The D/LZC and RP are organized and operated as described in paragraphs 32 and 33; the HS's, as described in paragraph 35.

35. Helicopter Site

The techniques for selecting, organizing, and operating a helicopter site apply to unit pathfinders as well as pathfinder detachments. The minimum landing space needed and the minimum distance between aircraft depend on a number of variables and should be prearranged between the aviation unit commander and the pathfinder detachment commander. The final decision concerning minimum landing requirements rests with the aviation unit commander.

a. Selection.

- (1) The selection of a helicopter site is based on consideration of the following:

- (a) The type helicopter employed.
 - (b) The number of helicopters required to land simultaneously at the site.
 - (c) The condition of the ground. The risk of helicopters bogging down, creating excessive dust, or drawing debris into the rotor blades must be minimized.
 - (d) The degree of ground slope. As a rule, helicopters cannot land safely if the slope is greater than 15 percent.
 - (e) The usable directions of approach into the site. If possible, helicopters should always approach into the wind. *Avoid* downwind approaches especially at night.
 - (f) The air density, as determined by the altitude and the temperature. The thinner the air, the lighter the load that a helicopter can carry and the more room it needs for "running" landings and takeoffs.
 - (g) The weight of the helicopter load. When fully loaded, most helicopters cannot ascend or descend vertically; thus, a larger area is required for the site.
- (2) Alternate landing points are selected at each helicopter site. An alternate point is used in case a helicopter becomes inoperable after landing at one of the primary points.
 - (3) Alternate sites may be needed due to enemy action, ground conditions, or changes in the tactical or logistical plan. They are selected to support the tactical plan. The ground commander decides whether and when to use the alternate sites and the pathfinder commander informs the site operators of the change in plans.
 - (4) Each helicopter site should be within ground radio communication range of the D/LZC.
 - (5) A more detailed discussion of helicopter site selection is given in TM 5-251.

b. Organization and Duties of Site Party.

- (1) The helicopter site party reconnoiters, prepares, and marks the helicopter site.
- (2) The minimum number of personnel in the helicopter site party and their basic duties are as follows:
 - (a) The helicopter site operator. He directs the positioning and operation of assembly and navigation aids and the selection, preparation, and designation of landing points for each helicopter. He controls the

landing and takeoff of helicopters and furnishes information to the D/LZC.

- (b) The pathfinder command net radio operator. He operates the radio and/or telephone that is used to maintain communication with the D/LZC and he assists the site operator. This radio operator may be attached from a ground combat unit.
- (3) Attached personnel may be included in the helicopter site party to perform the following duties:
 - (a) Assist in the unloading and initial assembly of troops, equipment, and supplies; and operate assembly aids as directed by the site operator.
 - (b) Assist in carrying and installing pathfinder equipment; remove or mark obstacles at landing and assembly points.
 - (c) Defend the helicopter site against attack.
- c. *Establishment of Helicopter Site.*
 - (1) The pathfinder command net radio operator places his radio in operation as soon as he lands. He carries the radio at all times so that he can maintain communication with the D/LZC.
 - (2) The helicopter site operator determines the direction of landing as soon as he arrives and transmits it to the D/LZC as soon as communication is established. He selects and marks the exact landing point for the lead helicopter of the flight. If the site is large and free of obstacles, he need not mark the other landing points for a daylight operation. If the helicopter site is restricted in area and/or there are ground obstacles, or the landings are to be made at night, he must select and mark all landing points.
 - (a) It is undesirable for a helicopter to fly directly over another aircraft which is on the ground; therefore, for an echelon left landing formation, the panel or light for the first helicopter in the flight must be the farthest forward and to the right. Whether the aids are arranged for a landing of the flight in line or in trail depends on the available landing space, obstacles, and prearranged flight formations. Landings on line are preferable because the danger of overshooting the landing point and colliding with a parked helicopter is eliminated. When helicopters are to land in trail formation, the landing points should be staggered

laterally to reduce the danger of collision, especially for night operations.

- (b) Panels are the best means for marking landing points for day operations (fig. 6). A panel is placed on the right edge of a desired landing point. An area 50 paces in diameter to the left of the panel is reconnoitered and prepared for landing. The pilot should land just to the left of the panel with the long axis of the helicopter parallel to the long axis of the panel. T panels indicate the flight leader's landing point and the direction of approach. The minimum panel requirement for unit pathfinders is the T. All panels must be secured to the ground so that rotor wash cannot blow them loose.
- (c) Lanterns are used to mark landing points and to indicate the direction of landing for a night operation (fig. 7). Lights of different colors may be used to designate different helicopter sites. T lanterns indicate the flight leader's landing point and the direction of approach. The helicopters land with the right

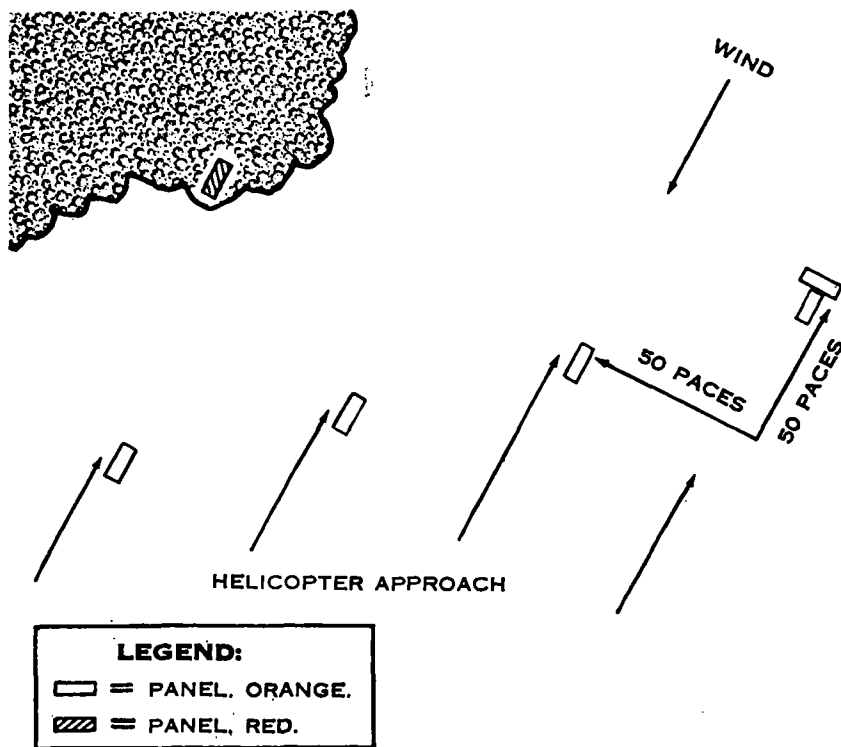


Figure 6. Day helicopter site.

landing gear just to the left of the lantern. All lights should be secured to the ground so they cannot be blown or knocked over. The lights must be beamed in the direction from which the helicopters approach. The minimum requirement for unit pathfinders is the T.

- (3) After the landing points have been selected, pathfinders immediately reconnoiter and prepare the landing circles ((2) (b) above). They make hasty improvements at the landing points, removing brush and filling holes, etc. They remove obstacles in the approach and departure paths, or mark them with red panels and/or red lights. The work toward improving the site should be continued as long as necessary.
- (4) Pathfinders mark initial assembly points for troops, equipment, and supplies. The points are located so that assembly will clear the helicopter site quickly and easily. If unit assembly areas are to be used, they are pre-selected by the ground unit commander. Personnel from the supported ground unit, who accompany the pathfinders, mark the unit assembly areas, establish assembly aids, and act as guides and unloading parties to insure rapid clearance of personnel, supplies, and equipment from the immediate vicinity of the landing points.
- (5) Security personnel move to their assigned locations and take up firing positions or assist pathfinders.

36. Operation of the Helicopter Landing Zone

a. Helicopters approach the landing zone along a designated flight route or air corridor. They are normally formed as a serial containing one or more flights. One serial may contain a flight for each helicopter site. Subsequent flights or serials follow at time intervals which permit the D/LZC and pathfinders at the helicopters sites to properly control landings. The landing of successive flights at one helicopter site should be separated by a minimum of 1 minute in daylight and 2 minutes at night.

b. As each helicopter serial reaches the air control point on the flight route, the serial leader initiates communication with the D/LZC. The D/LZC then furnishes the serial with information relative to the enemy situation, wind direction and velocity, and vectors to the helicopter sites; and gives him any other necessary instruction. The radio messages between the D/LZC and a serial containing four flights, with all pilots monitoring them, might be as follows:

Speaker	Topic	Message
Serial leader	Identification, location	PATHFINDER, THIS IS HAWK AT CONTROL POINT; OVER.
Pathfinder at D/LZC.	Acknowledgement	HAWK, THIS IS PATHFINDER;
	Vector from air control point to RP.	VECTOR, TWO EIGHT ZERO;
	Enemy situation	ENEMY MACHINEGUN VICINITY THREE NINE SIX EIGHT FOUR TWO;
	Wind direction, velocity.	WIND NORTHWEST AT ONE FIVE;
	Azimuths from RP to HS.	SITE AZIMUTHS: VIOLET, TWO EIGHT ZERO; YELLOW, TWO NINE ZERO; GREEN, TWO NINE FIVE; WHITE, THREE HUNDRED;
	Landing directions	VIOLET, LAND THREE THREE ZERO; YELLOW, LAND THREE THREE ZERO; GREEN, LAND THREE THREE FIVE; WHITE, LAND TWO SEVEN ZERO;
	Final clearance	CLEAR TO LAND; OVER
Serial leader	Acknowledgement	PATHFINDER, THIS IS HAWK; ROGER; OUT

c. While the ground-to-air net radio operator is exchanging messages with the serial leader, the pathfinder command net radio

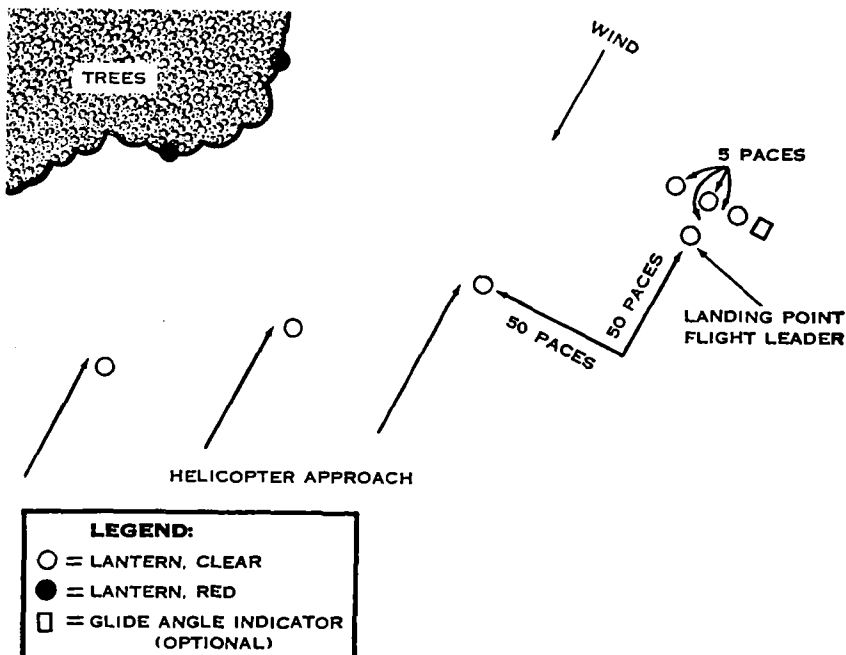


Figure 7. Night helicopter site.

operator at the D/LZC contacts the helicopter sites concerned and informs them that flights are approaching and instructs them to display navigation aids or take other appropriate action.

Note. When some or all alternate helicopter sites are used, it may be necessary to move the D/LZC in order to maintain pathfinder command net radio communication with all sites.

d. The helicopter formation continues along the flight route to the RP, assisted by the electronic and visual navigation aids at the RP. All helicopters pass over or near the RP and each flight moves directly to its assigned helicopter site. If any flight cannot locate its site, the D/LZC can furnish additional assistance.

(1) For a daylight operation, a specified smoke color may be assigned to each helicopter site to help identify it. Since the number of smoke colors is limited, the same color may have to be used by more than one helicopter site. Sites that use the same color should be those farthest apart.

(a) When smoke is used, care must be taken to avoid starting fires or masking the landing points.

(b) Smoke should be employed sparingly because it distinctly marks a location to enemy observers. Generally, it is used only on orders from the D/LZC in response to a pilot's request for help in identifying his helicopter site.

(2) For night operations, pyrotechnics take the place of smoke. Red signals should be employed only to signal DO NOT LAND or for other emergency signals. Emergency codes are included in unit SOP's.

e. Each flight lands at its assigned helicopter site in the manner indicated by the D/LZC messages and the visual aids displayed.

f. Pathfinders may use arm-and-hand signals to help control landings in both day and night operations. These signals, including approach and hold signals, are fully described and illustrated in FM 1-100.

Section IV. AIRPLANE LANDING ZONE

37. General

The techniques for selecting, organizing, and operating a landing zone apply to unit pathfinders as well as pathfinder detachments. An airplane landing zone has one or more landing strips. A landing strip may have a parking area, taxiway, and dispersal area, if required.

38. Detachment Organization and Duties

The pathfinder detachment is organized into two basic parties to operate an airplane landing zone: The D/LZC party and the parking party.

a. D/LZC and RP. A D/LZC is required at each landing strip. If a pathfinder detachment operates more than one strip, the primary D/LZC is located at the strip of the most importance. An RP is not required, but may be used, especially if the detachment operates more than one landing facility. The D/LZC and RP are organized and operated as described in paragraphs 32 and 33.

b. Parking Party. The parking party reconnoiters, prepares, and marks the landing strip, taxiways, parking areas, and dispersal areas; and provides parking and taxi signals for each airplane; maintains ground communication with the D/LZC; marks with visual aids the initial assembly points for troops; and furnishes limited security. The basic organization of the parking party is as follows:

- (1) *The parking party commander.* He directs the reconnaissance, preparation, and marking of the landing strip, taxiways, and individual parking and dispersal points for each airplane. He controls the parking and taxiing of airplanes and the initial assembly of troops, equipment, and supplies. He furnishes information to the D/LZC.
- (2) *Signalmen.* They aid in placing out and operating visual navigation aids and control the movement of aircraft on the ground.
- (3) *Others.* Additional personnel may be attached to the parking party to—
 - (a) Assist in the unloading and initial assembly of troops, equipment, and supplies; and to operate assembly aids as directed by the pathfinder commander.
 - (b) Assist in preparing runways, taxiways, parking areas, and assembly points by removing or marking obstacles.
 - (c) Defend the area against attack and assist other personnel as directed.

39. Selection of Airplane Landing Facilities

a. Landing Strip. Factors considered in the selection of aircraft landing facilities are discussed in detail in TM 5-251.

- (1) The surfaces of a landing strip must be smooth enough to permit aircraft to take off and land without damage,

and the ground must be firm enough to permit loaded planes to land, taxi, and take off without bogging down.

- (2) It is desirable for aircraft to land and take off into the wind. The approach and departure flight angles required should be considered, and obstacles in the approach and departure paths must be removed.
- (3) The minimum length and width required for a landing strip depend on the type aircraft that will use it and their type loads; wind direction and velocity; and the condition of the ground. The aircraft and pathfinder detachment commanders coordinate to determine the minimum dimensions of a landing strip; the final decision rests with the aviation unit commander. The following factors affect the dimension required:
 - (a) A strip on soft ground must be longer than one on hard ground.
 - (b) Uphill takeoffs and downhill landings require longer landing strips. Length correction factors for slope are given in TM 5-251.
 - (c) Crosswinds during takeoff and landing are hazardous and have the effect of increasing landing strip length and width requirements.
 - (d) The takeoff distance needed increases as the mean air density decreases. The effect of air density is explained in TM 5-251.
 - (e) When available facilities or time do not permit removal of obstacles in the approach and departure paths, the effect of the barriers on usable length must be considered.

b. Taxiways. Taxiways should be prepared on one or both sides of the landing strip so that planes can clear the strip immediately after landing. They must be wide enough to permit the largest aircraft employed to taxi from the departure end of the landing strip to the parking area, then to the approach end of the landing strip, leaving the landing strip clear for other landings or takeoffs.

c. Parking Areas and Points.

- (1) Parking areas are selected where aircraft can unload and/or load equipment, supplies, or personnel in accordance with a prearranged plan without interfering with the continuous operation of the landing strip. More than one parking area may be needed to provide enough parking points and to support the tactical plan. Heli-

copters should not be permitted to fly or taxi within 50 meters of airplanes.

- (2) The exact location of parking points (and their dispersion) depends on the condition of the ground, obstacles, types and number of aircraft, loads, and the tactical plan. The points should be where aircraft can enter and leave them without delay. Alternate points should be selected as time permits.

d. Dispersal Areas. Dispersal areas are used to park disabled aircraft and aircraft which are scheduled to remain in the area. The areas should afford concealment from ground and air observation and, where possible, ground masks between aircraft. More than one dispersal area may be needed to provide adequate aircraft dispersion.

40. Establishment of Airplane Landing Facilities

a. Landing Strip.

- (1) The pathfinder command net radios are prepared for operation immediately upon landing. Operators carry their radios at all times so that they can maintain constant communication with the D/LZC.
- (2) As soon as the parking party arrives, it reconnoiters the area. When the reconnaissance is completed, the pathfinder commander selects and points out to the parking party the exact landing strip to be used. He designates the center of the long axis or one of the sides of the runway by means of an azimuth or a terrain feature. The parking party then marks the landing strip with visual aids. For day operations, the strip is marked with signal panels (fig. 8); for night operations, with lanterns (fig. 9). If it is necessary to establish a priority in marking, it is set up in this order: near limit with wind indicator, far limit, $\frac{1}{3}$ marker, $\frac{2}{3}$ marker. Generally, all of these tasks can be performed simultaneously.
- (3) Concurrently with marking, the parking party makes hasty improvements by removing brush from or filling holes in the landing strip. It also removes or marks obstacles in the approach and departure paths as rapidly as possible.
- (4) All pathfinders should take care not to create obstacles by the erection of antennas or other equipment or the digging of field fortifications. They and their equipment should be kept clear of the landing strip so that they

will not obstruct approach and departure paths or distract the pilots.

b. Taxiways and Parking and Dispersal Areas. The taxiways and parking and dispersal areas are prepared in the locations designated by the pathfinder detachment commander. If there are enough men in the parking party, they are prepared simultaneously with the landing strip. They remove or mark obstacles and continue to improve the facilities as long as necessary.

- (1) Since pilot seats are on the left side of aircraft, the left edge of the taxiway is outlined with panels (lanterns) which should face the oncoming pilots as they taxi their aircraft.
- (2) A parking point for each aircraft may be marked with a panel (lantern). The pilot should park his aircraft to the right of his panel (lantern) and within wing length of it. Arrangements for parking should be planned.

41. Operation of Airplane Landing Zone

a. General.

- (1) The D/LZC pathfinder command net operator records the flight arrival and departure times and the type loads brought in and/or evacuated. The radio operator in the parking area transmits the load data to the D/LZC.
- (2) Landings and takeoffs by large numbers of aircraft present the most difficult control problem for pathfinders. Therefore, radio discipline is strictly observed to prevent interference with the exchange of messages between the D/LZC and flight leaders. D/LZC's must exercise the necessary control over pilots and signalmen, but they must avoid unnecessary and confusing radio transmissions.

b. Approach.

- (1) Aircraft approach the landing strip along a designated flight route. They are formed as flights. Succeeding flights follow at time intervals based on the availability of parking space and the time required to land and clear the landing strip. Individual aircraft landings are separated by a minimum of one-half minute during day and one minute during night operations. When departures are interspersed with landings, the arriving aircraft should be separated by a minimum of two minutes.
- (2) As each flight reaches the air control point, the flight leader initiates communication with the D/LZC, stating

the flight's location, number of aircraft, and type loads. The D/LZC then furnishes the pilots information relative to the enemy situation, wind direction and velocity, field elevation, direction and any other instructions necessary. The flight leader acknowledges the message and assigns the order of aircraft landings within the flight, if not preplanned, and issues any other necessary pilot instructions. The radio messages between the D/LZC and flight leader, with all pilots monitoring them, might be as follows:

<i>Speaker</i>	<i>Topic</i>	<i>Message</i>
Flight leader	Identification; cargo	PATHFINDER, THIS IS HAWK ONE AT CONTROL POINT; SIX U-1A'S WITH AMMUNITION; OVER.
Pathfinder at D/LZC.	Acknowledgment	HAWK ONE, THIS IS PATHFINDER; VECTOR, ONE FIVE ZERO;
	Vector from control point to landing strip or RP, as applicable.	
	Enemy situation	ENEMY MACHINEGUN VICINITY FOUR EIGHT SEVEN SEVEN FIVE ONE;
	Wind direction, velocity.	WIND WEST AT ONE FIVE;
	Azimuth to LS (if routed first to RP).	LANDING STRIP AZIMUTH, ONE EIGHT ZERO;
	Landing direction	LAND, THREE THREE ZERO;
	Traffic pattern (given only when traffic is not left hand).	TRAFFIC PATTERN (RIGHT) (STRAIGHT IN);
	Type of runway	SOD RUNWAY;
	Field elevation	ELEVATION SIX FIVE ZERO;
	Call final	CALL FINAL; OVER (This instruction tells the flight leader to notify the D/LZC when he commences final approach.)
Flight leader	Confirmation	THIS IS HAWK ONE; ROGER, OUT.

- (3) The pathfinder command net radio operator at the D/LZC informs the parking party that a flight is approaching.
- (4) The flight formation continues along the flight route to the landing strip (via the RP if required). If an aircraft or flight cannot locate the landing strip, the D/LZC furnishes additional assistance on request. When the flight arrives within sight of the landing strip, it breaks into a tactical landing formation or prearranged in trail formation. Each pilot notifies the D/LZC when his aircraft commences final approach.

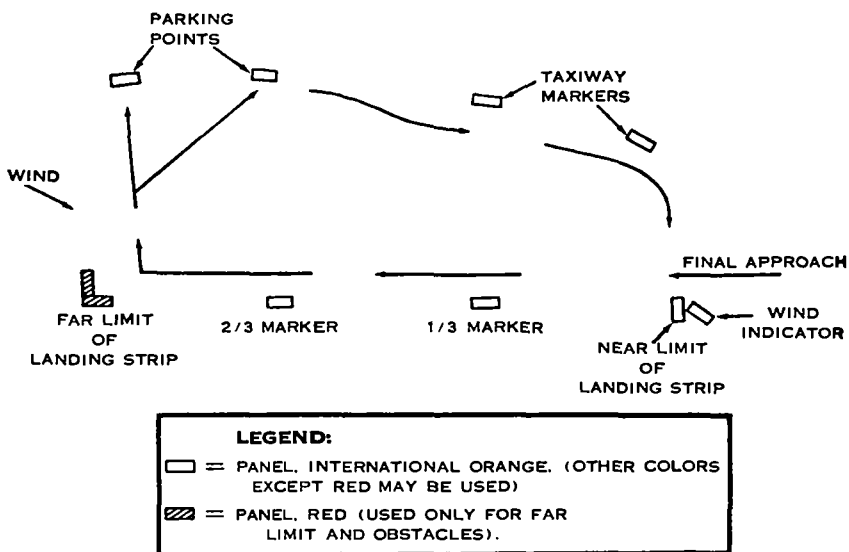


Figure 8. Day landing strip.

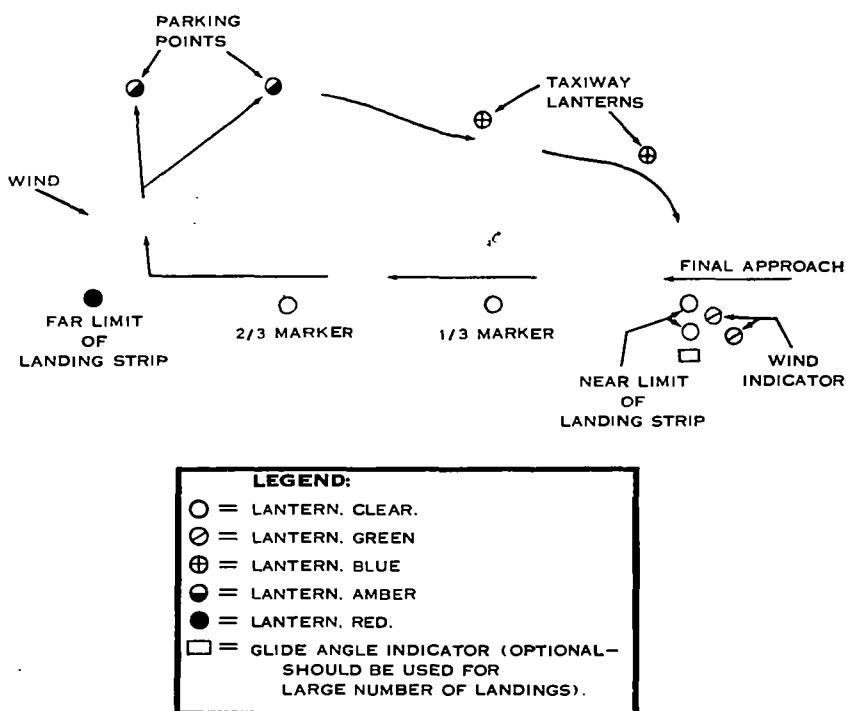


Figure 9. Night landing strip.

<i>Speaker</i>	<i>Topic</i>	<i>Message</i>
Flight leader	Location	PATHFINDER, THIS IS HAWK ONE; TURNING BASE; OVER.
Pathfinder at D/LZC.	Acknowledgment	HAWK ONE, THIS IS PATHFINDER;
	Clearance	CLEAR TO LAND
	Parking instruction	RIGHT TURN AT TAXI SIGNALMAN; OVER.
Flight leader	Confirmation	HAWK ONE; RIGHT TURN; OUT

c. Landing. Each aircraft lands in the manner directed by the D/LZC and the displayed visual aids.

- (1) Visual signals are used according to prearranged plan to assist the pilots in routine landings and in emergency situations. If ground-to-air communication fails, landings and takeoffs are controlled with visual signals and aids.
- (2) Care must be taken not to blind the pilots with smoke nor to confuse them with unnecessary or unusual signals.
- (3) If a dangerous landing situation occurs, the pathfinder detachment commander should hold the planes in the air until it can be cleared, and instruct the pilots via the ground-to-air radio or emergency visual signals.

d. Parking. As each aircraft touches down on the landing strip, the parking party assumes control.

- (1) A signalman guides each pilot from the landing strip to the taxiway. The pilot then taxis to the parking area by guiding on the visual aids displayed. On exceptionally poor or unmarked taxiways, it may be necessary for a signalman to lead each aircraft to its parking area.
- (2) As each aircraft enters the parking area, a signalman directs it to its designated parking point.
- (3) All parking, taxi, and arm-and-hand signals (FM 1-100) must be clearly visible and understandable to pilots. These signals are given from the left side of airplanes and the signalmen must be far enough from the planes to be in view of the pilots.
- (4) As soon as an aircraft has parked, personnel from the supporting unit who are attached to the pathfinders take charge of the unloading and initial assembly of the transported troops, equipment, and supplies. The movement and assembly must be performed rapidly and in a manner which does not block the landing strip, taxiways, or parking points. Movement across the landing strip is not permitted without specific approval from the D/LZC.

- (5) Disabled aircraft and those that cannot leave on schedule are moved to a dispersal area.

e. Departing. When aircraft are ready to depart, the parking party pathfinder command net radio operator notifies the D/LZC. A departure may be made by flight, a portion of a flight, or by individual aircraft, according to the plan and the existing situation. A signalman guides the aircraft out of the parking area and onto the taxiway in the order designated by the D/LZC. A signalman on the taxiway holds the aircraft there until the runway is clear. He releases them, one at a time, by this procedure: The D/LZC gives each pilot clearance via the ground-to-air radio, the pilot hand signals the signalman that he has been cleared, and the signalman releases him to enter the runway.

<i>Speaker</i>	<i>Topic</i>	<i>Message</i>
Pathfinder at D/LZC.	Identification-----	HAWK ONE, THIS IS PATH-FINDER;
	Taxiing instructions---	WIND WEST AT EIGHT; CLEAR TO TAXI;
	Takeoff instruction----	TAKE OFF THREE THREE ZERO; OVER.
Flight leader	Confirmation-----	PATHFINDER, THIS IS HAWK ONE; TAXIING FOR TAKEOFF, THREE THREE ZERO; WIND WEST AT EIGHT; OVER.
Pathfinder at D/LZC.	Clearance-----	HAWK ONE, THIS IS PATH-FINDER; CLEAR TO TAKE OFF.

Section V. DROP ZONE

42. General

a. The techniques for selecting, organizing, and operating a drop zone apply to unit pathfinders as well as pathfinder detachments.

b. A drop zone is a specified location where troops or materiel are air delivered. It has a D/LZC and one or more drop sites. The D/LZC may be established at or near the T location, and the D/LZC party may assume the duties of the T party. If two drop sites are established, each must have a D/LZC with the primary D/LZC at the most critical drop site. Normally, when only one drop site is used, an RP is not employed; but if a single drop site is operated in conjunction with helicopter sites, it is desirable to have an RP.

43. Detachment Organization and Duties

a. The pathfinder detachment is organized into a D/LZC party and a DZ party. The DZ party is further subdivided into a T party,

flank party, and far party. The T party prepares and places the panels (lanterns) that form the T; the flank and far parties position the flank and far panels (lanterns/beacons) respectively (figs. 10 and 11), and provide limited security.

b. The D/LZC and RP are organized and operated as described in paragraphs 32 and 33.

44. Selection of Drop Zone

a. A drop zone is located where it can best support the tactical plan. Factors to be considered in its selection are the—

- (1) Type aircraft to be employed.
- (2) Altitude at which air delivery is to be made.
- (3) Aircraft formation for air delivery.
- (4) Type loads to be delivered.
- (5) Relative number of obstacles in the area.
- (6) Availability of adequate aircraft approach and departure routes.
- (7) Method of air drop, i.e., free fall, high velocity, or low velocity.
- (8) Access to the area.

- b. (1) The length of the piece of ground needed for a drop zone can be computed, using the ground speed of the aircraft and the time needed to release its cargo. The formula is $L = ST$. L is the zone length in yards, S is the ground speed of the aircraft in yards per second, and T is the time required for an aircraft to release its cargo. To use this formula, air speed must first be converted to ground speed which will be expressed in knots (because Army aircraft register air speed in knots). The knots must then be converted to yards per second.

Note. When the velocity of the wind at the delivery altitude cannot be determined, use the aircraft's air speed as the ground speed.

- (2) To find the ground speed when an aircraft is flying into a headwind, subtract the velocity of the headwind from the air speed. For example, an aircraft flying into a 10-knot headwind at an indicated air speed of 110 knots would have a ground speed of 100 knots. (Crosswinds have a negligible effect on ground speed, so they need not be considered.) To find the ground speed when an aircraft is flying with a tailwind, add the velocity of the tailwind to the air speed: a 10-knot tailwind plus a 110-knot air speed equals a ground speed of 120 knots.

Note. It is desirable to fly aircraft into the wind during air delivery because the slower ground speed gives more time over the zone and assures a more compact ground pattern for the cargo.

- (3) To convert knots to yards per second, use this equation: 1 knot equals .56 yards per second. Thus, a ground speed of 100 knots equals .56 times 100, equals 56 yards per second.
- (4) To find the required length of a DZ using the formula $L = ST$ and applying the conversions described in (2) and (3) above, follow this example: An aircraft is flying at a ground speed of 90 knots; its cargo can be released in 8 seconds.

$$S = 50.4 \text{ yards per second } (.56 \times 90 = 50.4)$$

$$T = 8 \text{ seconds}$$

$$L = 50.4 \times 8 = 403.2 \text{ yards. (Round off this length to 404 yards.)}$$

c. Sometimes, a DZ of the desired length is not available. In such a case, the flight time over the zone, whatever its length, must be computed to determine how much of the load can be released in one pass and/or how many passes must be made to release the entire load. This formula is used: $T = \frac{L}{S}$. T is the time

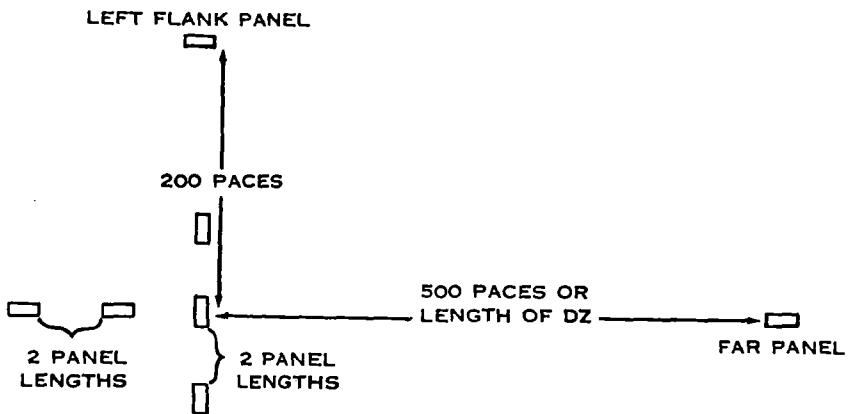


Figure 10. Day drop zone.

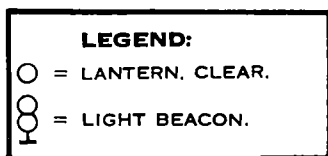
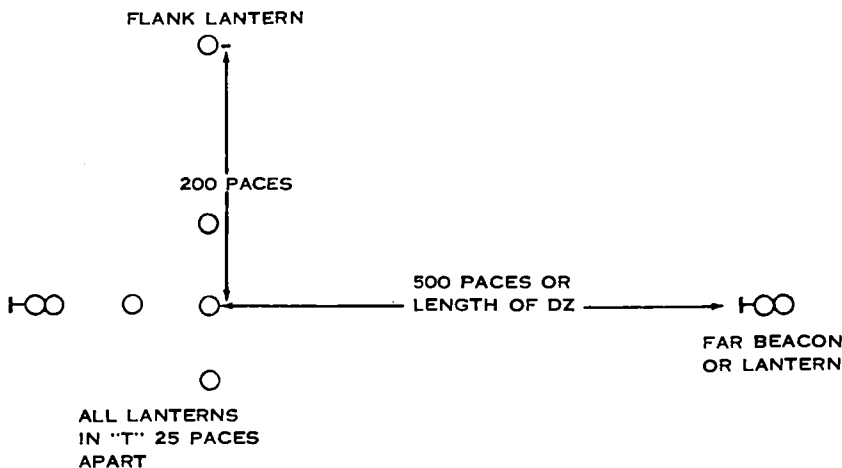


Figure 11. Night drop zone.

over the DZ, L is the length of the DZ, and S is the ground speed. For example, a field 150 yards long is available as a DZ and an aircraft can release its load at a ground speed of 105 knots or 59 yards per second ($.56 \times 105 = 58.8 = 59$). Therefore, 150 (L) divided by 59 (S) equals 2.5 seconds (T over the DZ).

d. The width of the piece of ground required for a DZ depends on the aircraft formation to be employed. For example, a single aircraft can drop its load in a zone no wider than the aircraft, but a Vee of UIA's would need a zone at least 80 yards wide.

45. Selection of T Location

a. *General.* The location of the T depends on the size and shape of DZ; the formation and ground speed of the aircraft, and their altitude over the DZ; the number of containers to be delivered and the time required to drop them; and the drift of parachuted loads which, in turn, depends on the direction and velocity of the wind. The T is alined with the stem parallel to the long axis of the DZ or on a prearranged azimuth. The aircraft fly up the stem of the T and start releasing their loads as they cross the junction of the stem and crossbar.

b. *Wind Drift Formula.* The formula, $D = KAV$, is used to determine the amount of drift (in yards) of cargo parachuted from a given altitude. K is a constant that represents the characteristic drift of a parachute of a certain model: for T-10 parachute, K is 4.5; for all other parachutes, K is 2.8. A is the altitude of the aircraft (in hundreds of feet) over the DZ. V is the velocity of the wind measured on the ground in miles per hour.

- (1) An anemometer can be used to measure wind velocity. Some anemometers give readings in knots rather than miles per hour. Knots are multiplied by 1.15 to convert to miles per hour, but the direct substitution of miles for knots in the wind drift formula is accurate enough for practical purposes.
- (2) Since pathfinders will not always be equipped with an anemometer, they must be able to estimate wind velocity with acceptable accuracy. They can learn to do this during training by observing the effect of winds of varying strengths on grass, dust, bushes, or small fragments of paper and comparing these effects with anemometer readings.
- (3) To illustrate how the wind drift formula works, assume that G-13 parachutes are used to drop cargo from an altitude of 500 feet in a 10-mile-per-hour wind. Then $2.8 (K) \text{ times } 5 (A) \text{ times } 10 (V) = 140 \text{ yards of drift.}$

46. Establishment of Drop Zone

a. *Day Drop Zone* (fig. 10).

- (1) The leader of the DZ party selects the exact location for the T. He then has the stem of the T alined on the predesignated heading or azimuth which he desires the aircraft to fly and supervises the placement of the center panel of the crossbar. This is the base panel.
 - (a) The T party places the two panels in the stem of the T, leaving a space two panels long between them and between the base panel and the stem panel next to it. The party then places the two additional crossbar panels perpendicular to the line of the stem and alined with the base panel.
 - (b) The flank party places a flank panel at the left limit of the DZ, parallel to the stem of the T and with the center of the panel alined with the crossbar.
 - (c) The far party places a panel at the far end of the DZ, erecting it vertically on a tree, bush, etc., parallel to

the desired line of flight, and in line with the stem of the T.

- (2) Concurrently, the D/LZC party prepares the ground-to-air radio and electronic homing beacons for operation. All electronic aids must be dispersed enough to prevent mutual electronic interference and simultaneous loss by enemy fire.

b. Night Drop Zone (fig. 11). The procedure for establishing a night DZ is the same as for a day DZ except that either infrared or incandescent lights are used to mark the T, the flank, and the far end. The interval between lights is 25 paces. One AN/CVX-1 beacon serves as the end light in the stem of the T, and another is used to mark the far end of the DZ. The beacon heads are coded at 180°. If only one AN/CVX-1 beacon is available, a lantern is used to mark the far end.

47. Operation of a Drop Zone

- a.* (1) As each flight reaches the air control point, the flight or serial leader informs the D/LZC and adds any necessary information as to the number and type of aircraft, loads, etc. The D/LZC gives the pilots information relative to the magnetic heading (vector) from the control point to either the DZ or the RP, the enemy situation, aircraft formation and drop altitude, map elevation of the highest point of the DZ, and any other instructions necessary. The pathfinder in command must carefully examine the map of the area and the actual topographical surroundings in the zone to make sure that there are no obstacles in the flight path on either the approach or immediate departure route. The elevation that the D/LZC gives to the pilots must be high enough to guarantee adequate clearance of all obstacles in the flight path. The flight leader acknowledges receipt of the message and complies with the instructions received.
- (2) As the lead aircraft comes into view, the D/LZC gives the pilot verbal instructions to guide him up the stem of the T, alerts him as he nears it, and tells him when to start releasing his load. Trailing aircraft, or others in the same formation, follow the movements of the lead aircraft as closely as possible and listen for corrective instructions from the D/LZC. The D/LZC prefaces individual instructions with the call sign of the aircraft that is to take action.

b. With an extremely restricted DZ, it may be necessary for each aircraft to make several passes over it, releasing a part of its load each time (par. 44c). A formation of single aircraft in trail is the best for such a situation. The D/LZC has the flight head up the stem of the T and over the DZ in a continuous circle, using either right- or left-hand traffic. Since the pilots in aircraft in trail can usually follow the lead aircraft accurately, the D/LZC rarely has to give them individual instructions.

c. For night operations, the wing lights of the aircraft (green on the right, red on the left) are turned on, with consideration for security requirements, so that pathfinders can determine the aircraft positions and headings.

d. Aircraft in Vee formation do not have the maneuverability of single aircraft in trail. For this reason, pathfinders must anticipate the additional space the pilots need to complete the corrective maneuvers, and the D/LZC must give instructions for the turns while the aircraft are still far enough away for the pilots to make directional changes gradually.

48. Examples of Pathfinder Guidance Procedure

a. General.

- (1) Once the aircraft come into view of the pathfinder at the D/LZC, he must keep them under constant observation to guide them correctly over the DZ. This means that the aircraft must be high enough to give the pathfinder a continuous line of sight to them. The pathfinder may have to instruct the pilots to change altitude to insure this.
- (2) The pathfinder starts by giving instructions only to the serial or flight leader, but all pilots in the serial or flight monitor the messages and follow the action of their leader. When the pathfinder needs to give instructions to individual pilots, he prefaces the instructions with the call sign of the pilot's aircraft.
- (3) If ground-to-air radio communication fails while the D/LZC is giving guidance, all pilots carry on with their missions, using the visual aids on the ground to make the correct approach. In this case, they release their loads as their aircraft pass over the junction of the stem and crossbar of the T.

b. Guidance for a Drop in Trail.

Flight leader: PATHFINDER, THIS IS HAWK ONE WITH SIX UIA's AT CONTROL POINT; OVER.

Pathfinder: HAWK ONE, THIS IS PATHFINDER; VECTOR, ZERO FOUR FIVE; ENEMY MACHINEGUN VICINITY TWO EIGHT FOUR SEVEN ONE THREE; DROP IN TRAIL AT TWO ZERO ZERO; (Gives DZ azimuth if flight is routed first to RP); FIELD ELEVATION, SIX FIVE ZERO; MAINTAIN (no. of feet) ALTITUDE UNTIL I HAVE YOU IN SIGHT; OVER.

Flight leader: PATHFINDER, THIS IS HAWK ONE, ROGER, OUT.

Pathfinder: (Later, to change flight altitude.) HAWK ONE, DESCEND TO THREE ZERO ZERO; OVER.

Flight leader: ROGER; OUT.

c. Guidance for Drop in Vees.

Flight leader: PATHFINDER, THIS IS DOVE ONE WITH SIX UIA's AT TWO ONE ONE SIX FIVE TWO; OVER.

Pathfinder: DOVE ONE, THIS IS PATHFINDER; VECTOR, ZERO SIX ZERO TO DROP ZONE; ENEMY SITUATION NEGATIVE, WIND NORTHWEST AT ONE FIVE; DROP IN VEEs AT TWO HUNDRED; MY ELEVATION, SEVEN SIX ZERO; MAINTAIN FIVE HUNDRED UNTIL I HAVE YOU IN SIGHT; OVER.

Flight leader: THIS IS DOVE; ROGER; OUT.

As the lead Vee comes into sight, the pathfinder guides it toward the T with the second Vee following. He may have to give instructions similar to the following when he first sights the lead aircraft.

Pathfinder: DOVE ONE, THIS IS PATHFINDER; STEER RIGHT.

The flight leader does not respond verbally, but follows the action directed by the pathfinder. When the flight leader is on the desired course, the pathfinder informs him.

Pathfinder: DOVE ONE, ON COURSE.

The flight leader straightens out so he will fly on the heading indicated at the time the pathfinder announces ON COURSE. Since all aircraft should change direction gradually, the pathfinder must start his instructions before the aircraft reach the point of change. If an abrupt turn is necessary, the pathfinder stresses the need as follows:

Pathfinder: DOVE ONE, STEER HARD LEFT.

The flight leader makes as sharp a turn as safety allows and continues until the pathfinder gives his next instruction:

Pathfinder: DOVE ONE, ON COURSE. (He alerts the flight leader as he nears the T.) DOVE ONE, STAND BY. (The flight leader prepares to execute air delivery. As he passes over the T, the pathfinder instructs him to start air delivery.) DOVE ONE, EXECUTE! EXECUTE! EXECUTE! (The flight leader, followed by all his aircraft in formation, executes the air delivery, maintaining his heading until he clears the DZ. He then leads his flight to the control point and/or his departure airfield.)

If the pathfinder sees that an aircraft is not in correct position to make the air delivery, he must warn the pilot and give him further instructions:

Pathfinder: DOVE TWO, NO DROP! NO DROP! NO DROP!

Dove Two: DOVE TWO, NO DROP.

Pathfinder: DOVE TWO, MAKE RIGHT TURN, FOLLOW DOVE SIX.

Dove Two makes a right turn and follows the last aircraft in the flight in a second pass over the DZ.

APPENDIX I

REFERENCES

AR 320-5	Dictionary of United States Army Terms.
AR 320-50	Authorized Abbreviations and Brevity Codes.
AR 725-5	Preparation, Processing, and Documentation for Requisitioning, Shipping, and Receiving.
JCS Pub 1	Dictionary of United States Military Terms for Joint Usage.
FM 1-100	Army Aviation.
FM 5-15	Field Fortifications.
FM 5-25	Explosives and Demolitions.
FM 7-24	Communication in Infantry and Airborne Divisions.
FM 7-100	Infantry Division.
FM 17-100	The Armored Division and Combat Command.
FM 20-32	Land Mine Warfare.
FM 21-5	Military Training.
FM 21-6	Techniques of Military Instruction.
FM 21-26	Map Reading.
FM 21-30	Military Symbols.
FM 21-31	Topographic Symbols.
FM 21-40	Small Unit Procedures in Nuclear, Biological, and Chemical Warfare.
FM 21-41	Solider's Handbook for Nuclear, Biological, and Chemical Warfare.
FM 21-60	Visual Signals.
FM 21-75	Combat Training of the Individual Soldier and Patrolling.
FM 24-18	Field Radio Techniques.
FM 31-21	Guerilla Warfare and Special Forces Opera- tions.
FM 32-5 (MAA).	Communication Security.
FM 57-30	Airborne Operations.
FM 57-35	Airmobile Operations.
FM 57-100	The Airborne Division.
TM 5-251	Army Airfields and Heliports.
TM 9-1370-200	Military Pyrotechnics.

TM 10-500	Series ; Aerial Delivery of Supplies and Equipment.
TM 11-287	Radio Sets AN/VRQ-1, AN/VRQ-2, and AN/VRQ-3.
TM 11-289	Receiver-Transmitters RT-66/GRC, RT-67/GRC, and RT-68/GRC.
TM 11-296	Radio Set AN/PRC-6; Operational and Organizational Maintenance.
TM 11-612	Radio Sets AN/PRC-8, -8A, -9, -9A, -10, -10A and 28; Operation and Organizational Maintenance.
TM 11-5020	Antenna Equipment, RC-292.
TM 57-210	Air Movement of Troops and Equipment.
TM 57-220	Technical Training of Parachutists.
TC 101-1	Prediction of Fallout and Radiological Monitoring and Survey.
TOE 7-168D	Pathfinder Team, Airborne.
ACP 150 (A)	(Title Classified)
ACP 168 (A)	Pyrotechnic Signals.
DA Pam 108-1	Index of Army Motion Pictures, Filmstrips, Slides, and Phonorecordings.
DA Pam 310-3	Index of Training Publications.

APPENDIX II

PATHFINDER OPERATION ORDER

1. General

The operation order is usually issued orally; however the sample operation order in paragraph 2 is included as a guide for pathfinder detachment commanders. It does not include all the details which might be given under different situations. The order is prepared for a reinforced pathfinder detachment supporting a battle group in a helicopterborne airmobile operation. This type of operation is used because it is the most complex for the pathfinder detachment to support.

2. Sample Operation Order

CLASSIFICATION

Maps: FRANCE, 1:25,000, CREST, 1, 2, 3, 4; MONTELIMAR 1, 2, 3, & 4.

Detachment Organization:

- a. *D/LZC:*
 - Pathfinders Detachment commander
 - Detachment executive officer
 - Attachments 2 EM, 1st BG, 87th Inf
- b. *RP:*
 - Pathfinder Detachment sgt
 - Attachments 2 EM, 1st BG, 87th Inf
- c. *Each Helicopter Site.*
 - Pathfinder 1 Pathfinder
 - Attachments 2 EM, 1st BG, 87th Inf
- d. *Rear Detachment.*
 - Pathfinder Assistant detachment sgt

1. SITUATION

- a. *Enemy:*
 - (1) Reserve estimated to be one rifle battalion is in the vicinity of the landing area.
 - (2) There are no known tanks in the landing area.
- b. *Friendly:*
 - (1) 10th Infantry Division (—) attacks 030500 Oct, penetrates enemy defenses, follows and supports 2d Armored Division when passed through.
 - (2) 1st, 2d, and 3d Battle Groups, 87th Infantry, by daylight airmobile assault beginning 030600 Oct, seize, organize, and defend airhead astride DROME River until linkup with 2d Armored Division.

CLASSIFICATION

CLASSIFICATION

- (3) 2d Armored Division passes through 10th Infantry Division (—) by 041900 Oct, and expands bridgehead over the DROME River.
- (4) Forward observer party from 25th FA Battalion accompanies pathfinder detachment to control artillery and guided missile support.
- (5) Air Force FAC from first TAF accompanies pathfinder detachment to control air support.

2. MISSION

187th Pathfinder detachment lands in sector by helicopter at H-20 minutes, establishes helicopter landing zone for airmobile operation by 1st BG, 87th Inf. On order, establishes and operates aircraft landing zone or drop zone for resupply.

3. EXECUTION

- a. *Concept of operation:* 187th Pathfinder detachment, reinforced, lands by helicopter at H-20 minutes, and establishes one helicopter landing zone with eight helicopter sites; prepares for subsequent establishment and operation of airplane landing zone or drop zone.

- b. *D/LZC party:*

- (1) Land by helicopter 985 and 880 at coordinates 125883.
- (2) Ground-to-air radio ready for operation by 0550 hours.

- c. *Helicopter site parties:*

- (1) Land at following site coordinates:

	<i>Hepr</i> <i>No.</i>	<i>Primary</i>	<i>Vector</i> <i>from RP</i>	<i>Altern</i>	<i>Vector</i> <i>from RP</i>
(a) Yellow One	080	114912	080	125922	082
(b) White One	080	133906	084	143916	087
(c) Violet One	080	118897	089	128907	091
(d) Green One	775	100868	093	110888	097
(e) Yellow Two	775	110872	098	120892	101
(f) White Two	775	122855	110	126877	112
(g) Violet Two	880	156871	114	169894	117
(h) Green Two	880	161857	123	184872	126

- (2) Prepare landing points for four helicopters at each site.
 - (3) Conduct radiological monitoring en route and at sites.
 - (3) Conduct radiological monitoring en route and at sites.
 - (4) Be prepared for pickup and move to another area to establish an airplane LZ or DZ, on order.
- d. *RP party:*
 - (1) Land by helicopters 775 and 080 at coordinates 099884.
 - (2) Emplace visual letter "H" and radio beacon.
 - e. *Assistant detachment sergeant remain at loading area with vehicles and night aids.*
Displace ¼-ton truck and night aids to D/LZC on order.
 - f. *Attachments:* Join respective parties at loading area by 0330 hours.
 - g. *Coordinating instructions:*
 - (1) H-hour 030600 Oct.
 - (2) Air movement plan:
 - (a) Par. 3c for helicopter assignments.

CLASSIFICATION

CLASSIFICATION

- (b) Senior pathfinder in each helicopter coordinate with pilot to prepare strip map of flight route.
- (c) Pathfinder will fly in trail at minimum altitude—100 knots.
- (d) Stations—0508; takeoff—0513; land—0540.
- (3) Air loading plan:
 - (a) Loading area vicinity 026618.
 - (b) Pathfinder helicopters ready for loading at 0443 hours.
- (4) Four flights of four H-34's each will land at each site at one minute intervals.
- (5) EEI. Location and strength of enemy air defense and armor.

4. ADMINISTRATION AND LOGISTICS

- a. D/LZC, RP, and site parties carry SOP equipment.
- b. Site parties suffixed "one" carry four smoke grenades of site color designated.
- c. Site parties suffixed "two" carry eight smoke grenades of site color designated.
- d. Each man carry one ration.
- e. Each man carry SOP ammunition.
- f. ADP at 120891 opens H-5 hours.
- g. Aid station at 115905.
- h. Prepare vehicles, night navigation and landing aids, and remainder of detachment equipment for on-call delivery by helicopter.

5. COMMAND AND SIGNAL

- a. *Signal.*
 - (1) Index 1-12, 10th Infantry Division SOI in effect.
 - (2) Radio silence in landing area until H-10.
 - (3) Code letter "H" displayed at RP.
 - (4) On order of D/LZC, helicopter sites display the color and number smoke grenades designated by their site codes.
 - (5) Yellow smoke displayed at RP for each serial.
 - (6) Mark each troop assembly point with one vertical orange panel.
 - (7) Landing area net on listening silence until 0555.
- b. *Command.*
 - (1) CP, 1st Battle Group, 87th Infantry initially vicinity D/LZC.
 - (2) Senior pathfinder in each party is in command of attached personnel until their release by order of D/LZC.

CLASSIFICATION

APPENDIX III

OPERATION FORMS

1. General

The forms described here are used to facilitate organization of the pathfinder detachment for operations and to maintain an accurate record of personnel and material delivered and evacuated during an operation. The forms are intended as a guide and may be modified as required.

2. Operation Planning Form (fig. 12)

a. Purpose. This form is used by the detachment commander in organizing his team for an operation. It consolidates information pertinent to each individual and can be used as a reference by the commander during his planning and briefing for an operation.

b. Explanation of Form Headings.

- (1) *Aircraft number.* The chalk number or the last three digits of the serial number of the aircraft in which the individual will be transported.
- (2) *Exit number.* The order in which the pathfinders will leave the aircraft.
- (3) *Name.* The name of the pathfinder.
- (4) *Position in chain of command.* A number indicating the relative order of rank within the detachment or within teams, if widely dispersed (i.e., for a helicopter landing zone operation).
- (5) *Duty and location.* The job assignment and location within the landing area for each pathfinder.
- (6) *Call sign and frequency.* The radio call sign and frequency for those individuals operating radios.
- (7) *Equipment.* That equipment, other than individual equipment, that each pathfinder will carry for an operation.

3. Landing/Drop Zone Control Record (fig. 13)

a. Purpose. This form is used to maintain a record of aircraft arrivals, departures, and locations in the landing area. It serves

as a source of information for both ground and aircraft commanders, aids in accounting for personnel and equipment, and is instrumental in making efficient use of available aircraft. The form is normally maintained by the pathfinder command net radio operator at the D/LZC.

b. Explanation of Form Headings.

(1) Date/time group.

- (a) Pfdr Team.* Coded or numbered designation.
- (b) Supported Unit.* Ground unit designation.
- (c) Period.* Date and time operation commenced until 2400 hours the following day, or 0001 until 2400 hours.
- (d) Operation.* Special designation or operation plan number.
- (e) (LS) (LZ) (DZ) Designation.* Cross out items in parentheses not applicable and add special designation given (if any).
- (f) Recorder.* Name of person who has recorded data on the form.

(2) Column headings.

- (a) Flight or aircraft number.* Radio call sign of the flight or aircraft.
- (b) Type aircraft.* Army or Air Force model designation.
- (c) Time communication established.* Time aircraft acknowledges contact (radio or visual, as applicable).
- (d) Time.*
 - 1. Arrival.* Time aircraft, or first of flight, sets wheels down.
 - 2. Departure.* Time aircraft, or last of flight, has wheels up.
- (e) Type load.*
 - 1. Delivered.* Type supply, or equipment, or number of personnel delivered.
 - 2. Evacuated.* Type supply, or equipment, or number of personnel evacuated.
- (f) Destination.* Aircraft destination within the landing area.
- (g) Remarks.* Indicate specific equipment delivered or evacuated, and amounts. Other pertinent remarks which may assist in correcting communications, field marking techniques, etc., for future operations.

PATHFINDER OPERATION PLANNING FORM

ACFT NO.	EXIT NO.	NAME	PSN IN CHAIN OF COMMAND	DUTY & LOCATION	SIGN & FREQUENCY	EQUIPMENT
256	1	Capt. Fowlkes	1	Detachment Commander	Alfa 51.0 mc	PRC-10, CVX-1 Spotlight
251	1	Sgt. Tribble	3	Site NCO Green HS	Red 49.6 mc	PRC-10, 4 Green smoke grenades, 5 VS-17 panels.

Figure 12. Operation planning form (sample extract).

PF Det 187
Supported Unit 1/29 Inf
Period 210001-212400 May 60
Operation YELLOW JACKET
(LS)(LZ)(DZ)
Designation BRAVO
Recorder SFC G. E. Turner

Flight or Aircraft No.	Type Acft	Time Comm Established	Time		Type Load		Destination (HS, LS, or DZ)	Remarks
			Arr	Dep	Delivered	Evac		
<u>(Example for Landing Strip Operation)</u>								
Mike 1	U1A	0600	0620	0625	75 cases Rats	2W1A	Alfa White	
Mike 2	U1A	0600	0620	0625	40 cases Rats & Ammo, 8/clip	2W1A	Alfa White	Damaged propeller. To dispersal area.
Mike 3	U1A	0600	0620	0625	10 cases Rate 3.5 RL & Cal 30 8/Clip	3W1A	Alfa White	
<u>(Example for Drop Zone Operation)</u>								
Red 1	U1A	1705	1720		Cal 30 8/Clip & linked		Echo Yellow	
Red 2	U1A	1705	1720		Unk		Echo Yellow	Aborted 1 mi
Red 3	U1A	1705	1720		60 cans Water		Echo Yellow	cut.
3564	H34	1720	1740		75 cases Rations		Echo Blue	4 broken cases.
<u>(Example for Helicopter Site Operation)</u>								
Violet 1	H34	1215	1225	1226	9 Pers		Hotel Green	
Violet 2	H34	1215	1225	1226	9 Pers		Hotel Green	
Violet 3	H34	1215	1225	1226	1/4 T Trk		Hotel Green	
Violet 4	H34	1215	1225	1230	9 Pers	4W1A	Hotel Green	Radio doesn't receive.

Figure 13. Landing/drop zone control record (sample extract).

APPENDIX IV

PROGRAM OF INSTRUCTION FOR UNIT PATHFINDERS

1. General

Pending publication of an ATP, the POI in paragraph 2 is recommended for training unit pathfinders.

2. Program of Instruction

<i>Subject</i>	<i>Hours</i>	<i>Scope</i>	<i>References</i>
Equipment and techniques.	70		
	(1)	Orientation on training course	All below
	(16)	Mission, organization, equipment, techniques, and employment	FM 57-(38)
	(5)	Tactical planning and conduct of air landed operations	FM 57-35
	(40)	Practical exercises in day and night operation of electronic and visual navigational aids, assembly aids; reconnaissance, selection, and operation of air delivery and landing facilities.	FM 1-100
			TM 5-251
			FM 57-35
			FM 57-(38)
	(4)	Familiarization with Army aircraft	TM 57-210
	(4)	Examinations	All above
Communications	10		
	(1)	Message writing	FM 21-75
	(4)	Communication security and authentication systems	Unit SOI & SSI
			FM 24-18
			FM 32-5
	(1)	Operation codes	Unit SOI & SSI

	(2)	Radio Sets AN/PRC-6 and PRC-10	FM 24-18
			TM 11-5020
			TM 11-296
	(1)	Radio interference and jamming	TM 11-612
	(1)	Examinations	FM 24-18
	<u>80</u>		All above
Total Hours			

APPENDIX V

CHECKLIST FOR PATHFINDER OPERATION

On receipt of an order to execute a pathfinder operation, the pathfinder commander follows, to the extent possible, the following procedure:

a. From the information available determines the necessity for attachments of personnel or additional equipment. Makes tentative requests if required.

b. Alerts his team and briefs them on—

- (1) Equipment requirements.
- (2) Assembly areas where he will meet them prior to commencing the actual operations.
- (3) Method of entry into the objective area.
- (4) Units participating in operation.
- (5) Types of aircraft to be employed.
- (6) Depending security classification nature of enemy action known and anticipated.

c. Moves to the mounting areas and establishes liaison with the CO and staff of ground unit and if possible with supporting aviation unit.

(1) Determines in as much detail as possible:

- (a) Loading plan of ground unit.
- (b) Landing plan of ground unit.
- (c) Studies objective area, time and date of landing and weather to determine—
 1. Visibility conditions.
 2. Suitability of terrain.
 3. Parking, unloading and departing procedure.
 4. Studies unit's SOI.

(2) From the above prepares tentative operational plan for the Pathfinder.

(3) Makes estimate of—

- (a) Necessity for additional personnel.
- (b) Necessity for additional equipment or material.
- (c) Communications plan.

- (d) Time and method of entry into objective area by the pathfinder team.
- (4) Prepares tentative plan and submits to ground unit commander or his staff.
- (5) Prepares final plan based on ground units' desires and final order.

GLOSSARY

AIRCRAFT GUIDANCE—Electronic or visual assistance given an aircraft pilot to help him arrive at, land on, operate within or over, and depart from an air landing or air delivery facility.

AIRMOBILE OPERATION—Operation in which combat forces and their equipment move about the battlefield in aerial vehicles under the control of a ground force commander to engage in ground combat.

CROSS LOADING—A system of loading troops in a single aircraft so that they may be disembarked or dropped at two or more landing or drop zones and thereby establishing unit integrity upon delivery.

PATHFINDER BEACON—A light-transmitting device (incandescent radio or infrared) used to assist in the guidance of aircraft and/or assembly of ground units.

PATHFINDER DROP ZONE/LANDING ZONE CONTROL—The communication and operation center from which pathfinders exercise aircraft guidance.

PATHFINDER DETACHMENT—Army TOE pathfinder organization. See **PATHFINDERS** and **UNIT PATHFINDERS**.

PATHFINDER GUIDANCE—Aircraft guidance provided by pathfinders.

PATHFINDERS—Personnel who precede or accompany the assault echelon of an Army unit engaged in an air landed or air delivered operation to establish and operate navigation aids in the objective area for the transporting aircraft. See **PATHFINDER DETACHMENT** and **UNIT PATHFINDERS**.

RELEASE POINT—A clearly defined point on a route at which specified elements of a column of ground vehicles or serial or flight of aircraft revert to the control of their respective commanders.

UNIT PATHFINDERS—Selected personnel from ground units/installations trained in pathfinder techniques. See **PATHFINDERS** and **PATHFINDER DETACHMENT**.

BY ORDER OF THE SECRETARY OF THE ARMY:

G. H. DECKER,
General, United States Army,
Chief of Staff.

Official:

R. V. LEE,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army: To be distributed in accordance with DA Form 12-7 requirements for FM 57-series (unclas) plus the following formula:

ACSI (2)	Inf BG (5)
DCSOPS (2)	Bn (5)
CofOrd (1)	Inf Co (5)
CofEngrs (1)	USAIS (331)
TQMG (1)	USACGSC (50)
CofT (1)	Units organized under following
CCmlo (1)	TOE:
CSigO (1)	1-7 (3)
US ARADCOM (2)	1-17 (3)
US ARADCOM Rgn (1)	1-57 (3)
MDW (5)	1-67 (3)
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Regt/Gp (1)	55-58 (3)

NG: State AG (3); units organized under following TOE: 1-7, 1-17, 17-1, 33-510 (AA) (2).

USAR: Same as Active Army except allowance is one copy to each unit.
For explanation of abbreviations used, see AR 320-50.

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